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AMRL-TR-75-50 Volume 142



USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK Volume 142 F-101B in-Flight Crew Noise

AUGUST 1979



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ABSTRACT (Continue on reverse side if necessary and identify by block number)	wasthan interested
The F-101B is a two-seated, long-range, all This report provides measured data defining	
ments at the pilot's location inside this a	
conditions. Data are reported for one loca	
of physical and psychoacoustic measures: of	
pressure levels, C-weighted and A-weighted	

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Timiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, "USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application," AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc.

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# **PREFACE**

This report was prepared by the Biodynamic Environment Branch, Aerospace Medical Research Laboratory, under Project/Task 723108, Crew Safety In Operational Noise Environments.

The author acknowledges the efforts of Mr. John N. Cole who established the data analysis requirements, Mr. Henry Mohlman and Mr. Fred Lampley of the University of Dayton who assisted in the mechanics of data processing and Mrs. Peggy Massie who typed this report and prepared it for publication.

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## INTRODUCTION

The USAF F-101B is a two-seat long range all-weather interceptor manufactured by the McDonnell Aircraft Corporation. Power is provided by two J57-P-55 turbojet engines manufactured by the United Aircraft Corporation. Pratt & Whitney Aircraft Division.

This volume provides measured data defining the bioacoustic environments produced inside the aircraft. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with operations of the F-101B aircraft.

This volume is one of a series published by the Aerospace Medical Research Laboratory (AMRL) under the same report number (AMRL-TR-75-50) as a multi-volume handbook that quantifies the noise environments produced at flight ground crew locations and in surrounding communities by operations of Air Force aircraft and ground support equipment. The far-field, community-type, noise data in the handbook describe the noise produced during ground operations of aircraft ground support equipment, and other ground-based equipment or facilities.

Volume 1 of this handbook discusses the objectives and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. Refer to Volume 1 (reference 1) for such information because it is not repeated in other handbook volumes.

A cumulative index lists those aerospace systems contained in the handbook, and identifies the specific volumes containing each type of environmental noise data available (i.e., in-flight /flight crew and passenger noise, near-field ground crew noise, far-field/community noise). Volume numbers are assigned sequentially as individual volumes are published. This index is periodically updated as individual volumes are published, and is available upon request from AMRL/BBE, Wright-Patterson AFB, OH 45433. Organizations on the distribution list for the handbook will automatically receive a copy of the updated index as it is generated.

Direct any questions concerning the technical data in this report and other handbook volumes to: AMRL BBE, Wright-Patterson AFB, OH 45433; Autovon 78-53675 or 78-53664; Commerical (513) 255-3675 or (513) 255-3664.

<sup>1.</sup> Cole, John N., USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application, AMRL-TR-75-50 (1), Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio, 1975.

## IN-FLIGHT NOISE

#### **MEASUREMENTS**

All noise measurements were made on-board a F-101B aircraft during typical speed, altitude, and flight maneuver conditions. These levels describe the standard F-101B environments but may not be representative of those levels encountered if the aircraft has been configured differently (e.g., major equipment or structural changes).

Acoustic measurements were made inside the cockpit at the pilot's location. Table 1 lists the measurement location and test conditions as numeric/alphabetic designators which are used on the data pages. The designator 1/A means measurement location 1 and test condition A, etc.

The microphone was attached to the pilot's helmet by means of a lightweight boom. This arrangement enabled adjustment of the microphone close to the ear level at a distance of 0.1 meter with its diaphragm parallel and facing away from the helmet's surface. In the analysis, microphone corrections for random incidence were applied to the overall system response. The recorded samples were analyzed using a four or eight second integration time to obtain a power-averaged level which effectively smooths out short duration fluctuations and best describes the exposure.

#### **RESULTS**

The measured data presented in Table 2 define the sound pressure levels (SPL) produced inside the F-101B aircraft at the specified location. This table includes the overall, 1/3 octave band, and octave band levels. From these data, C-weighted and A-weighted sound levels, maximum permissible time for one exposure per day (AFR 161-35) with and without standard Air Force ear protectors, preferred speech interference level, and perceived noise level are calculated and presented in Table 3. These measures are widely used to assess the effects of noise on personnel and their performance.

 $\begin{tabular}{ll} \textbf{TABLE 1} \\ \end{tabular}$   $\begin{tabular}{ll} \textbf{MEASUREMENT LOCATIONS AND TEST CONDITIONS} \\ \end{tabular}$ 

## F-101B, Tyndall AFB FL, 5 June 78

Location	Position	Height Above Deck
1	Pilot	Seated Head Level
Condition		Description
A		Ground Run Up, Engine #1 Engine Idle — Canopy Open
В		Ground Run Up, Engine #2 Engine Idle — Canopy Open
С		Ground Run Up — Both Engines Idle — Canopy Open
D		Ground Run Up — Both Engines 70% — Canopy Open
E		Taxi - Canopy Down
F		Engine Run Up - Canopy Closed
G		Takeoff - Roll
Н		Takeoff — Gear Up
I		Climb 10,000' 25,000'PA
J		Cruise 25,000'PA — 83M
K		Descent 25,000'PA 🔪 — .69M
L		High Speed Run 1500' — 250KIAS
M		Approach Traffic Pattern
N		Landing Roll
O		Taxi — Canopy Closed

All Test Conditions are recorded with EC System settings at Normal — Comfortable

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